

## *Carex semihyalofructa*, a New Species of *Carex* Sect. *Rarae* (*Capitellatae*) from Japan

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*Carex semihyalofructa* is described as new based on a specimen collected at Mt. Kurikoma, Akita Prefecture, Japan. Though similar to *C. fulva*, *C. onoei* and *C. uda*, *C. semihyalofructa* is clearly distinguished by its nerveless and beakless utricles, creeping rhizomes and by the wide space that surrounds the achenes in their utricles. *C. semihyalofructa* occurs throughout central and northern Honshu, along the Japan Sea side from Fukui to Akita Prefectures.

Key words: *Carex fulva*, *Carex onoei*, *Carex semihyalofructa*, *Carex uda*

In 1979, the author collected an unusual sedge in the north of Nagano Prefecture, Honshu, Japan. The plant superficially resembled *Carex fulva* Franch., *C. onoei* Franch. et Sav. and *C. uda* Maxim., though its culms and leaves were soft, as in the aquatic plant *Vallisneria gigantea*, and cernuous hence leaning on neighbouring plants. Further fieldwork revealed that the sedge usually grows partly hidden by surrounding vegetation, often making it difficult to find in the field. On account of its creeping rhizome, it is difficult to remove the plant intact from the dense, boggy soil in which grows.

For these reasons, the sedge is apparently absent from the major herbaria of Japan, though represented in certain local collections, including Niitsu Herbarium, Niigata Prefecture. However, most herbarium material had been referred to *Carex fulva* (Ohwi 1936, Akiyama 1955), to *C. onoei* (Yoshikawa 1958), or to *C. uda* (Yoshikawa 1958). Incomplete specimens lacking rhizomes seem to be the main reason for misidentification. As such, the sedge appears to have been taxonomically

neglected, and until now not recognized as a distinct species.

In this paper, the sedge is described as new and compared taxonomically with allied species, *Carex fulva*, *C. onoei* and *C. uda*. A distribution map for the species is presented and all specimens seen in the course of the study are cited.

***Carex* (Sect. *Rarae*) *semihyalofructa* Tak. Shimizu, sp. nov.** (Figs. 1, 2 (1~8) & 3)

‘*C. fulva* Franch.’ Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ. ser. B, 11: 439, 1936, pro parte; Akiyama, Carices Far East Asia Pl. 5, Fig. 3, A, 1955, pro parte.

‘*C. onoei* Franch. et Sav.’ Yoshikawa, Icon. Jap. Carex 2: Pl. 105, 1 & 2, 1958.

‘*C. uda* Maxim.’ Yoshikawa, ibid. Pl. 106, 1-12.

Affinis *Careci fulvae* Franch., sed differt utriculis enervatis, erostratis, achaenio perlaxe incluso, rhizomate repente.

Type: JAPAN, Akita Pref.: near Mt. Kurikoma,

Higashinaruse-cho, Ogachi-gun, 1050 m alt., July 7, 2003, Tak. Shimizu 03-381 (Holotype in KYO, Isotype in SHO).

The following description is based entirely on the type specimen:

Perennial herb, rhizomes creeping; culms 20-26 cm tall, 0.6-0.8 mm thick, 3-angled with scabrous, thin, narrow wings, very soft; leaves filiform, slightly shorter than culms, 1.7-2.0 mm wide, scabrous abruptly narrowed to apex, flat, thin, very soft; basal sheath dark grayish brown, lusterless; spike solitary, terminal, androgynous, ovate, only

weakly flattened, 6-7 mm long, 5-5.5 mm wide; staminate portion inconspicuous, 2-3-flowered, scales ovate, 2.4-2.6 mm long, ca. 0.8 mm wide, acute or obtuse at apex, involute; pistillate portion 6-9-flowered, scales ovate, acute or obtuse at apex, with a dark green mid-nerve, 2-2.4 mm long, 1-1.1 mm wide, membranous, slightly reddish, light brown; utricles longer than scales, ascendent, 2.6-3.1 mm long, 1.2-1.5 mm wide, ovate or narrowly ovate, nearly lenticular in transection, acutely angled at both lateral sides, gradually tapering to apex, with a nearly entire mouth, not stiped at base, nerveless or sometimes with obscure thin nerves, light

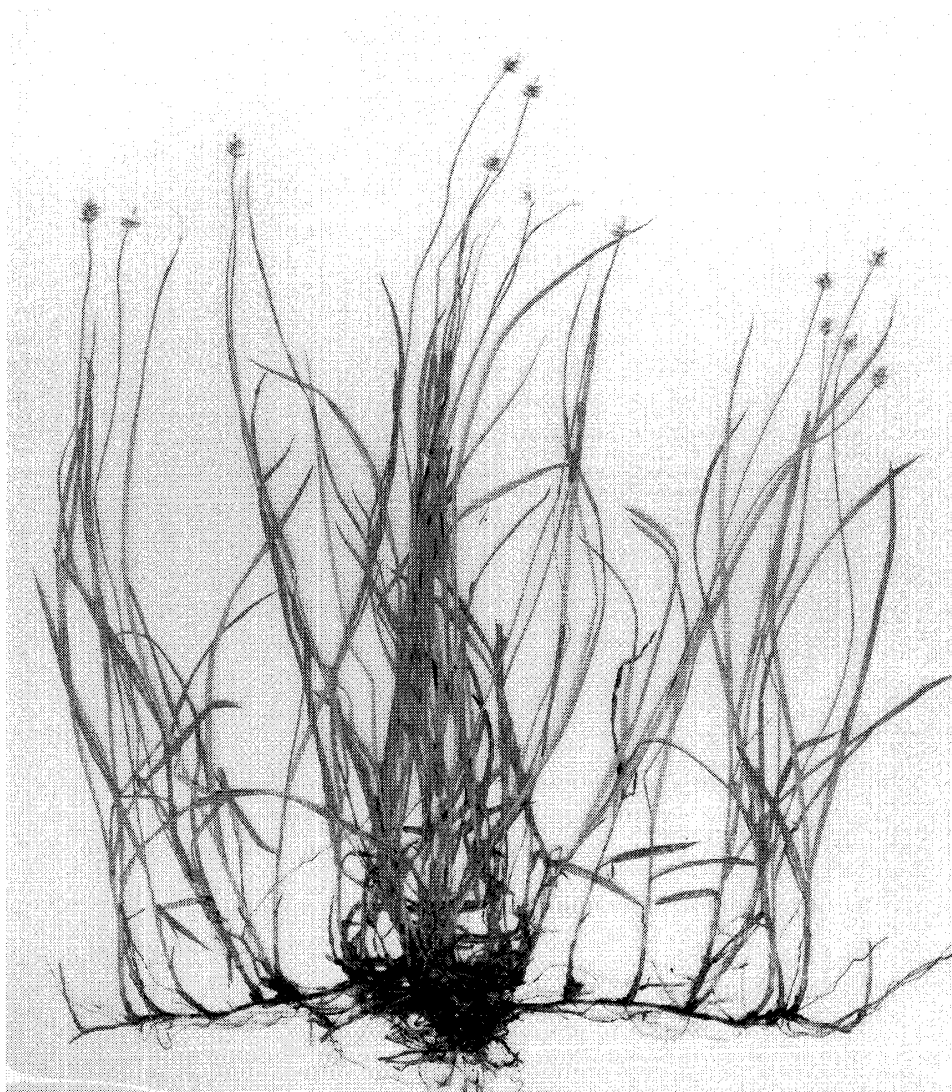


FIG. 1. Holotype of *Carex semihyalofructa* ( $\times$  ca. 1/2)

greenish brown, wrinkled, membranous, glabrous, having wide space around periphery in utricle; achene very loosely included in utricle, elliptic, slightly compressed trigonous, 1.4-1.6 mm long, ca. 0.8 mm wide; stigmas 3, ca. 1.5 mm long.

I also observed a number of additional specimens (as cited below) on which basis the following data are added to the original description:

Culms 20-45 cm tall, 0.6-1 mm thick, leaves 1.7-2.8 mm wide, basal sheath light brown or rarely dark grayish brown; spikes 5-8 mm long, 4-5.5 mm wide, staminate 2~3 (4)-flowering, pistillate 6~13-flowered, scales 1.9-2.5 mm long, pallescent or slightly reddish, light brown, lowest one sometimes aristate, utricle 2.4-3.1 mm long, 1.1-1.7 mm wide, ovate or narrowly ovate, sometimes triangular ovate.

*Habitat:* Muddy or wet, humus-rich soils, in semi-shade under mixed *Fagus crenata* and *Abies mariesii* forest.

*Japanese name:* Yukiguni-harisuge

*Carex semihyalofructa* is closely allied to *C. fulta*, *C. onoei* and *C. uda*. However, in *C. semihyalofructa* the narrowly ovate utricle tapers gradually to an apex, and contains the achene only very loosely. As such, wide spaces are visible around the circumference of the achene in the utricle (Figs. 2-1 & 5). In contrast, *C. fulta* has ovate or roundish utricles with a slender beak, such that a space is only present along the lateral and lower edges of the achene (Figs. 2-9 & 13). In *C. onoei* (Fig. 2-17) and *C. uda* (Fig. 2-21), the utricles are narrowly oblong and have a broad beak, with spaces at lower and upper edges of the achene.

Longitudinal nerves are obscure on the utricles of *Carex semihyalofructa* (Figs. 2-2, 3, 6 & 7), though they are thick and several towards the edges of the utricle in *C. fulta* (Figs. 2-11 & 15). In *C. onoei* and *C. uda*, many (more than eight) thin longitudinal nerves are present across both dorsal and ventral surfaces (Figs. 2-18 & 19 and 2-22 & 23, respectively).

A single spike bears 6-13 utricles in *C. semihyalofructa* (Figs. 2-4&8), (8-) 15-23 in *C. fulta* (Figs. 2-12&16), 5-11 (-13) in *C. onoei* (Fig. 2-20), and 15-22 in *C. uda* (Fig. 2-24).

The flowering season also differs among the four species: late June to mid- August in *Carex semihyalofructa*, late April to late June in *C. fulta*, late April to early June in *C. onoei*, and early May to mid-June in *C. uda*.

*Carex semihyalofructa* is distributed along the Japan Sea side of central and northern Japan, from Fukui to Akita Prefectures (Fig.3). *C. fulta* has a wide distribution throughout the Tohoku and Chubu regions of Honshu, towards both the Japan Sea and Pacific Ocean side, and is rarely known from Hyogo and Okayama Prefectures. *C. onoei* has a Pacific distribution from Hokkaido to Nagano Prefecture and westwards into the Kii peninsula and Shikoku. *C. uda* ranges along the Pacific coast of Hokkaido and rarely in Nagano Prefecture.

The differences between these four species are summarized in the following key (p. 37-38).

*Other specimens examined:* **Miyagi Pref.:** Mt. Kurikoma, *S. Murai* 138 (SAPS). **Yamagata Pref.:** Nenbutsugahara to Hijiore-onsen, Mt. Gassan, Okuramura, *Tak. Shimizu* 02-362 (KYO), *S. Kato* 15765 (YMG); Ubasawa, Mt. Gassan, Nishikawa-cho, *Y. Yuhki* 13509 (YMG), *Tak. Shimizu* 02-394 (KYO); Baramomizawa, Mt. Gassan, Tachikawa-cho, *S. Kato* 15715 (YMG); Mt. Hayama, Murayama-shi, *S. Takahashi* 36972 (YMG); Mt. Hayama, Nagai-shi, *T. Kiyono* 39769 (YMG), *Tak. Shimizu* 02-349 (KYO). **Fukushima Pref.:** Mt. Hiuchigatake, Hinoemata-mura, *Tak. Shimizu* 87-1611 (KYO). **Niigata Pref.:** Mt. Naeba, *J. Yoshikawa* 1246 (TNS, TUS, TPM), *S. Iwano* 830 (TUS), *M. Takeuchi* (TI), *Tak. Shimizu* 00-327 (KYO, OKA); 00-331 (KYO); Renge-onsen to Tengunoiwa, Itoigawa-shi, *Tak. Shimizu* 87-1689 (KYO), *S. Ishizawa* 82255, 82505, 124378 (NNH); Renge-onsen to Oike, Itoigawa-shi, *J. Yoshikawa* 170 (TNS); Mt. Kurohime, Omi-cho, *T. Shimizu* 13082 (SHIN), *J. Yoshikawa* (TPM); Mt. Inugatake, Omi-cho, *S. Ishizawa* 136093, 136107 (NNH); Umanori-no-baba, Mt. Ryogatake, Yasuzuka-cho, *S. Ishizawa* 45950, 45962 (NNH); Mt. Okenashi, Arai-shi, *J. Yoshikawa* 27439 (KANA), 3922

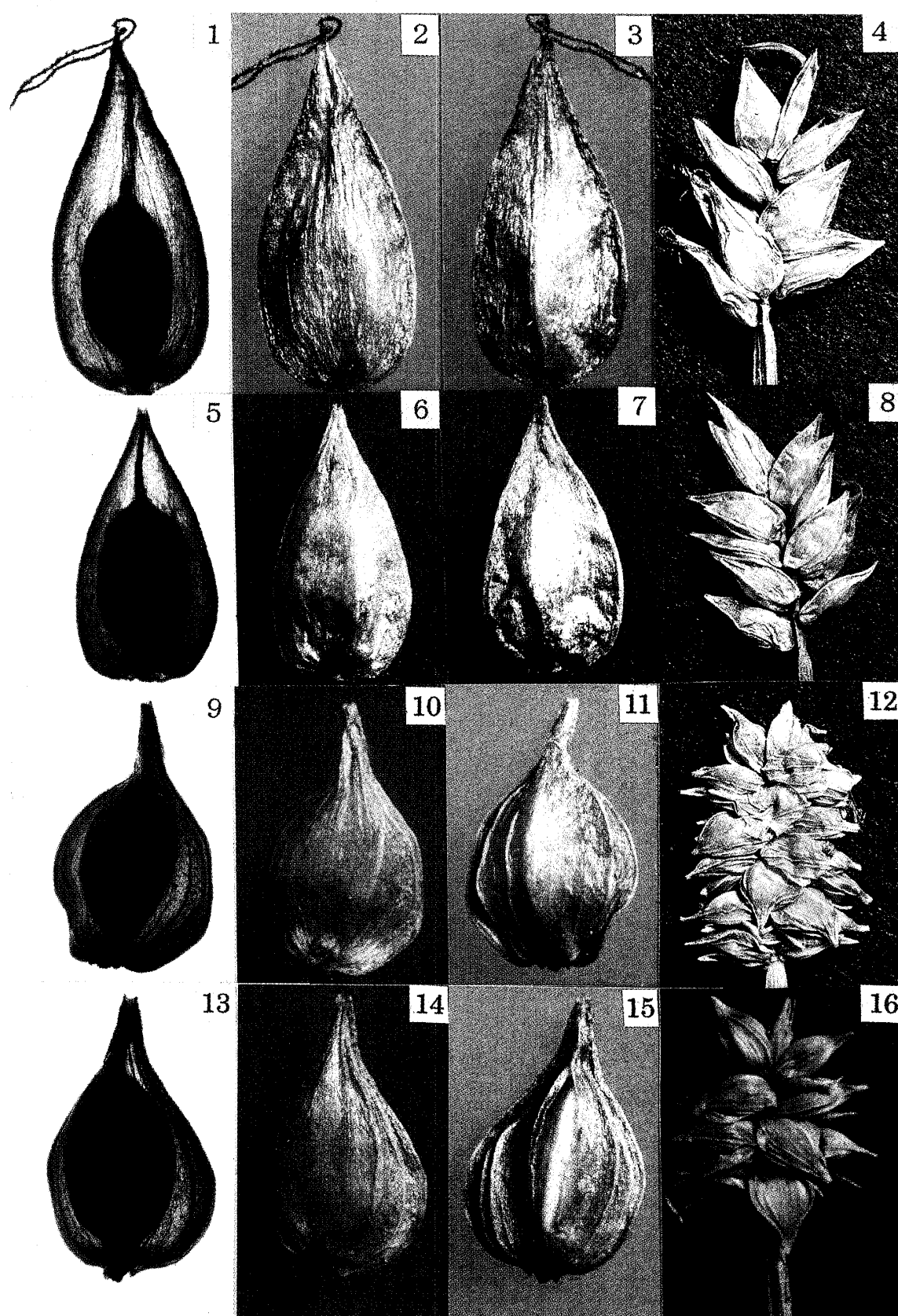


FIG. 2. Utricles ( $\times$  ca. 18) and spikes ( $\times$  ca. 7) of *Carex semihyalofructa* (1-4: Mt. Kurikoma, Tak. Shimizu 03-381; 5-8: Mt. Naeba, Tak. Shimizu 00-331); *C. fulva* (9-12: Mt. Gosha-zan, Tak. Shimizu 00-276; 13-16: Renge-onsen, Tak. Shimizu 87-1711);

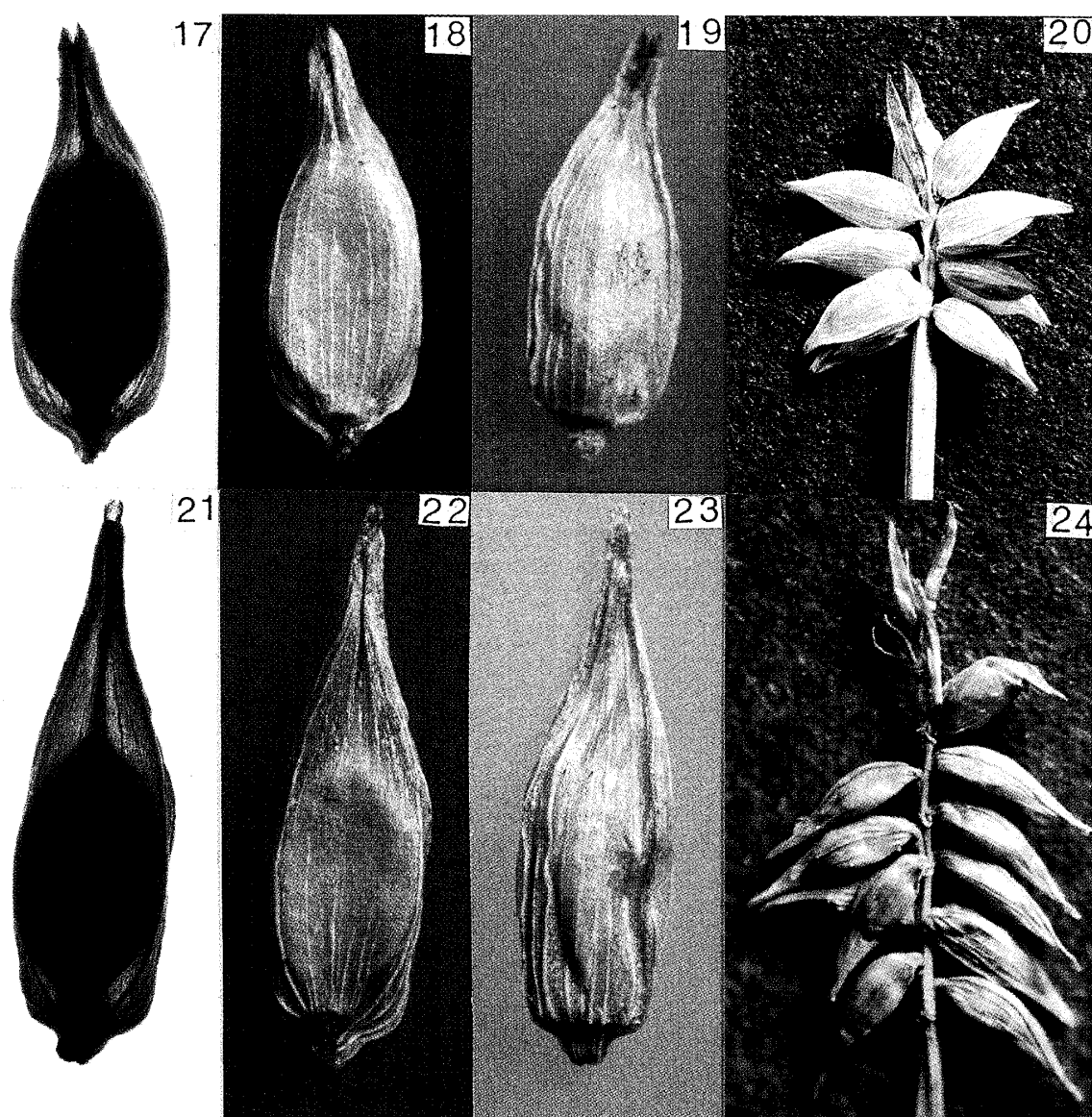


FIG. 2. (continued) *Carex onoei* (17~20: Lake Yamanaka-ko, Tak. Shimizu 01-214); and *C. uda* (21~24: Akkesi-cho, Tak. Shimizu 85-679). Left row: achenes in utricle seen through by light (50 W). Middle two rows: dorsal view of utricles. Ventral view of utricles. Right row: spikes.

(SHO). **Nagano** Pref.: Mt. Naeba, Sakae-mura, *M. Mizushima* (MAK), *I. Yokouchi* 01231, 07883, 0613 (SHIN), *S. Ishizawa* 68652, 68677, 148800, 148906, 156265 (NNH), Tak. Shimizu 00-316 (KYO); Nonoumi, Sakae-

mura, *S. Ishizawa* 60105 (NNH); Nonoumi, Iiyama-shi, *Y. Matsuda* 01816 (SHIN); Tsugaikedaira, Otari-mura, Tak. Shimizu 00-340 (KYO); Sarukura to Yari-onsen, Hakubamura, Tak. Shimizu 79-29 (KYO, SHO); Mt. Shirouma-

1. Utricles closely enclosing achenes on both lateral sides, nerves more than eight on both dorsal and ventral surfaces.....2
2. Culms scabrous; pistillate scales partly remaining when ripe; spikes consisting of 5-11 (-13) utricles; utricles 2.2-3.0 mm long, patent, with a 2-teethed mouth .....*C. onoei*
2. Culms smooth; pistillate scales wholly deciduous before ripening; spikes consisting of (8-) 15-22 utricles; utricles (3-) 3.2-4.0 mm long, reflexed, with a nearly entire mouth .....*C. uda*

1. Utricles loosely enclosing achenes with wide space around them, nerves obscure or thick and several on both lateral sides and sometimes also in the centre .....3
3. Utricles with wide spaces around the entire circumference of achenes, lacking beaks, nerves obscure; spikes consisting of 6-13 utricles, lax, ascendent, sometimes patent in lower half; rhizome creeping; flowering from late June to mid-August .....*C. semihyalofructa*
3. Utricles with wide spaces only along the lateral and lower edges of achenes, with narrow beak, nerves thick, 3-5 (-8) on both lateral sides and sometimes in the centre; spikes consisting of (8-) 15-23 utricles, dense, patent, often reflexed in lower half; plants densely tufted; flowering from late April to late June .....*C. fulva*

dake, *T. Kodama* (OSA), *H. Shimura* (MAK). **Toyama** Pref.: Mt. Nagatsuga, Asahi-machi, *S. Ishizawa* 135770 (NNH); Mt. Asahi-dake, Asahi-machi, *H. Shinno* (TOYA); Mt. Asahi-dake to Mt. Shirouma-dake, Asahi-machi, *H. Ota* (TOYA); Mt. Iburi, Asahi-machi, *M. Ota* (TOYA); Mt. Akao, Asahi-machi, *H. Ota* (TOYA); Daikoku-kozan, Kurobe, Unazuki-cho, *J. Ohwi* 8207, 8240 (KYO); Mt. Sogatake, Uozu-shi, *Ota et Ishizu* (TOYA), *M. Nagai* (TOYA). **Ishikawa** Pref.: Mt. Hakusan, *Tak. Shimizu* 88-669 (KYO), *M. Hashimoto* 3014 (TNS, KANA), *T. Shimizu* 4574

(KYO). Fukui Pref.: Mt. Akausagi, Oono-shi, *S. watanabe* 13294, 25010 (KYO, FUKUI); Mt. San'nomine, Oono-shi, *S. Watanabe* 10873 (FUKUI).

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FIG. 3. Area of distribution of *Carex semihyalofructa*.

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Toyama City Science and Culture Center, Toyama (TOYA); of Kanazawa University, Kanazawa (KANA); of Fukui City Museum of Natural History, (FUKUI); of Shinshu University, Matsumoto (SHIN); of Kyoto University (KYO); of Osaka Museum of Natural History, Osaka (OSA); of Shoei Junior College, Kobe (SHO); and of Okayama University of Science, Okayama (OKAY). I offer deep gratitude to the directors and the curators of these herbaria.

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